

## 10 ORIGINAL RESEARCH

# Anthropometric Somatotypes in Youth in a Rural School District in Kansas

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## ABSTRACT

**Introduction:** According to a report by the *Trust for America's Health and the Robert Wood Johnson Foundation*, the state of Kansas has the 47th highest rate of childhood obesity at 10.6% for children ages 10-17. It ranks the 22nd highest for obesity in high school students at 15.1% and 12th highest for obesity in adults at 35.2%.

**Purpose:** The purpose of the study was to verify somatotypical characteristics of K-12 students within a rural school district in the state of Kansas to chart and analyze how each grade level compares to one another and categorize children into one of three different anthropometric somatotypes.

**Methods:** The somatotypical values of 345 students were obtained via Heath-Carter's method for anthropometric measurements. Children were grouped into four different grade groups: K-3 (n=91), 4-6 (n=84), 7-9 (n=88), and 10-12 (n=82), respectively. Data were taken to classify students in each grade group in one of the three following categories: endomorphic, mesomorphic, or ectomorphic. The *Anthropometrics Standardization Reference Manual* and the *International Biological Program* references were pursued anthropometric measurements. Measurements used to conduct somatotypical calculations include weight and height measurements, as well as skinfolds of the triceps, the subscapular, the suprascapular, and the calf. Other measurements include the circumferences of the biceps, the humerus bicondylar, the femoral bicondylar, and the calf. For statistical analysis, the STATISTICA version 7.1 software was used for statistical evaluation and ANOVA analyses. When a significant F-ratio was obtained, a Tukey's Honestly Significant Difference test was performed. Statistical significance was accepted at  $p < 0.05$ . All data are presented as the mean  $\pm$  SD.

**Results:** Endomorphic scores of children in grades 10-12 ( $6.2 \pm 2.0$ ), 7-9 ( $6.2 \pm 2.7$ ), and 4-6 ( $5.9 \pm 2.7$ ) were higher than for those in K-3 ( $3.6 \pm 1.9$ ;  $p < 0.05$ ). Mesomorphic scores of children in grades K-3 ( $4.5 \pm 1.2$ ) were higher than for those in 7-9 ( $3.1 \pm 1.3$ ;  $p < 0.05$ ) and 10-12 ( $3.3 \pm 1.6$ ;  $p < 0.05$ ), and mesomorphic scores of children in grades 4-6 ( $4.5 \pm 4.5$ ) was higher than for those in 7-9 ( $3.1 \pm 1.3$ ;  $p < 0.05$ ). Ectomorphic scores of children in grades 4-6 ( $2.8 \pm 1.5$ ), 7-9 ( $3.0 \pm 1.5$ ) were higher than for those

in K-3 ( $2.2 \pm 1.2$ ;  $p < 0.05$ ), and ectomorphic scores of children in 7-9 ( $3.0 \pm 1.8$ ;  $p < 0.05$ ) was higher than those in 10-12 ( $2.3 \pm 1.2$ ;  $p < 0.05$ ).

**Conclusion:** Significant differences were found between other grade groups. The comparison of the different anthropometric somatotypes of the four different grade groups shows that as children get older, the more endomorphic their physiques seem to be. From these results, it is apparent that the K-3 grade group is considered ideal compared to other grade groups, as it has the lowest endomorphic score and a relatively higher mesomorphic score. Considering this finding, this school district could consider implementing physical activity and wellness education programs as early as the third grade. Generally, an earlier implementation of physical activity and wellness education programs could help to decrease the childhood obesity rate.

**Discussion:** General limitations of this study include that the data is not categorized by age nor sex, but rather generalized as a grade group. Other limitations could include the rural location of the school district, as rural areas tend to have a lower socioeconomic groups and limited access to foods, especially when compared to areas of higher populations and socioeconomic statuses. Areas of lower socioeconomic status may have food deserts, which would affect the diets of the local children, further affecting levels of obesity. Future studies should consider looking at multiple, intersectional factors such as age, sex, levels of physical activity, race/ethnicity, socioeconomic class, and levels of health education received.

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